THE OPTICAL
MAGIC LANTERN
JOURNAL
AND
PHOTOGRAPHIC ENLARGER.

EDITED BY J. HAY TAYLOR.

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CONTENTS.

	PAGE
Notes	93
Railways and Compressed Gas	94
How Cylinders are Tested	94
Magazine and Science Lantern	96
Hand Cameras for obtaining Slides for the Lantern	97
New Apparatus	97
Cheap Apparatus for Copying Slides	98
Making Hydrogen Gas	100
Hints on Screens	101
Acetylene	103
A Talk on Condensers and Lenses	104
Editorial Table	107
Correspondence	107
Notes and Queries	108

Notices.

THE *Optical Magic Lantern Journal and Photographic Enlarger* is issued on the 1st of every month, price One Penny, and may be obtained from all Newsvendors, Railway News Stalls, Photographic Dealers, or from the Publishers, at the following rates, post free:—

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NOTICE.

	Each.	Postage.
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Reading Cases with 12 cords at back	1/3	1½d
Bound Vols. for 1894	3/-	4½d.

Notes.

THE Americans have discontinued the compressing of gas in cylinders at the high pressure recently introduced. This has been brought about by the action of the railway and express companies in having refused to handle the cylinders under any and all conditions unless charged to a pressure not exceeding 200 lbs. to the square inch. In this country, as is well known, we paint our oxygen cylinders BLACK, and the hydrogen ones RED; but in America it is the custom to make those containing oxygen RED, and hydrogen BLACK.

* * *

AFTER a series of experiments with regard to primary colours, Capt. Abney finds that they are not red, yellow and blue, but red, green and bluish yellow.

* * *

AN International Photographic Exhibition is announced to take place at Salzburg; it will last from August 1st till September 15th, and will be held in the palace of Mirabell. Objects for the exhibition are to be announced to the committee not later than 15th inst. The exhibition is intended to show not only the beauty of Nature in Alpine countries, but also the manners, together with the original dress (Costumes) of the inhabitants. Full particulars may be obtained from the office of the International, 1, Church row, Fenchurch Street, London, E.C.

* * *

"WE give no apparatus, either silvered or otherwise, to editors to induce an editorial notice"—thus runs a circular issued in the interests of the licencees of a particular saturator.

As we believe that there has been only one silvered saturator manufactured, and that was presented to us, it may interest our readers to know that this silvered saturator was acknowledged on page 192 of our issue for August, 1894. We may add that the inventor of the saturator, in whose interests the afore-mentioned circular is issued and which contains the statement made at the commencement of this paragraph, also presented us with a saturator of his make, and this will be found duly acknowledged on page 45 of our issue for March, 1893.

* * *

Owing to the strict conditions under which railway companies will in future carry cylinders of compressed gas, the difference between one and two cylinders will become an important item; consequently, it may safely be predicted that "saturators" will be in great demand during the coming season, as with them only one cylinder (oxygen) is required.

—:o:—

Railways and Compressed Gas.

Having received a number of letters of enquiry respecting the conveyance of cylinders of compressed gas by the various railway companies, we communicated with the principal of them, and at the time of writing have heard from the following:—

*Great Western Railway
London and South Western Railway
Glasgow and South Western Railway
London, Chatham and Dover Railway
Belfast and North County Railway
Great Northern Railway
London and North Western Railway
London, Brighton and South Coast Railway
Great Eastern Railway
Caledonian Railway

Cylinders to be protected either by being fixed in a wooden box without lid and with rope handles, or in box with lid secured by a strap. Or cylinder may be encased by woven wickerwork, hemp, or coir; valve not to project beyond. The railway company to be exempt from all liability, and a declaration to be signed to the effect that cylinder is made of wrought iron or mild steel containing not more than 0·25 % carbon, and is thoroughly annealed and tested. It must be left at parcels office and will be conveyed by the earliest train convenient, excepting trains which carry the mails. Senders omitting to give notice in writing of the actual contents of such packages, or "smuggling" cylinders as passengers' luggage, will be liable to a penalty of £20. Two cylinders must not be put in one package.

Metropolitan District Railway
Highland Railway Company
Brecon and Merthyr Railway
Midland Railway.

The conditions are at present under consideration.

Metropolitan Railway

Conveyance of cylinders strictly prohibited.

—:o:—

How Cylinders are Tested.

Since our last issue we have received some interesting particulars from Mr. Henry F. Brier, of Glasgow, with reference to the business of gas compressing, which will go a long way to reassure users of compressed gas that the risk they run when using cylinders is exceedingly small. It will be remembered that we mentioned there were cylinders of compressed oxygen in the Glasgow Theatre Royal, at the time of its being burnt down. It appears there were no less than fourteen cylinders full of oxygen, each of 80 ft. capacity, which had been delivered at the theatre only an hour before the fire was discovered, and they were heaped up on the floor in a very exposed part of the building, and were subjected to intense heat. The floor was eventually burnt away and the cylinders precipitated into the water which had accumulated below the stage.

Upon the cylinders being examined, one was found to be full of gas, four others contained from sixty to seventy feet, although the soldering of the valves was partially melted and run out, seven were empty, their valves having become unsoldered by the heat. One had its neck completely burned away in a manner which shows that it must have been red hot before the gas escaped. The steel must have been burning by the assistance of oxygen, for it was attacked and burned from the inside. Only one cylinder gave way, and we believe it to be the one which was made of steel of abnormal thickness. It is worthy of note that this cylinder, although burst, was in one piece, no part of it being detached from the main body. All the other cylinders were intact.

Mr. Brier has recently introduced further important improvements in his testing apparatus for high pressure gas cylinders.

The old form had a fixed head or jointing ring, and cylinders could only be tested for expansion from the shoulder downwards, whilst cylinders with splayed bottoms could not be tested at all. But these difficulties are all overcome in the present apparatus.

By the use of a few loose annular jointing rings of various sizes, which can be fitted round the neck of any shaped cylinder, a perfect joint can be made instantly by allowing a pressure of water to inflate the rubber collar.

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* With respect to the Great Western Railway Company, these conditions refer to the trains only, and do not extend to their steamers going to Jersey, etc., as cylinders will not be carried by these boats under any conditions.

It is necessary, in order to obtain correct readings, that the pressure in the inflated rubber should be constant, this is managed by having either a fixed head of water, or by means of a weighted piston as shown in Fig. 1. The accumulator is loaded with rings of cast iron to obtain the desired pressure.

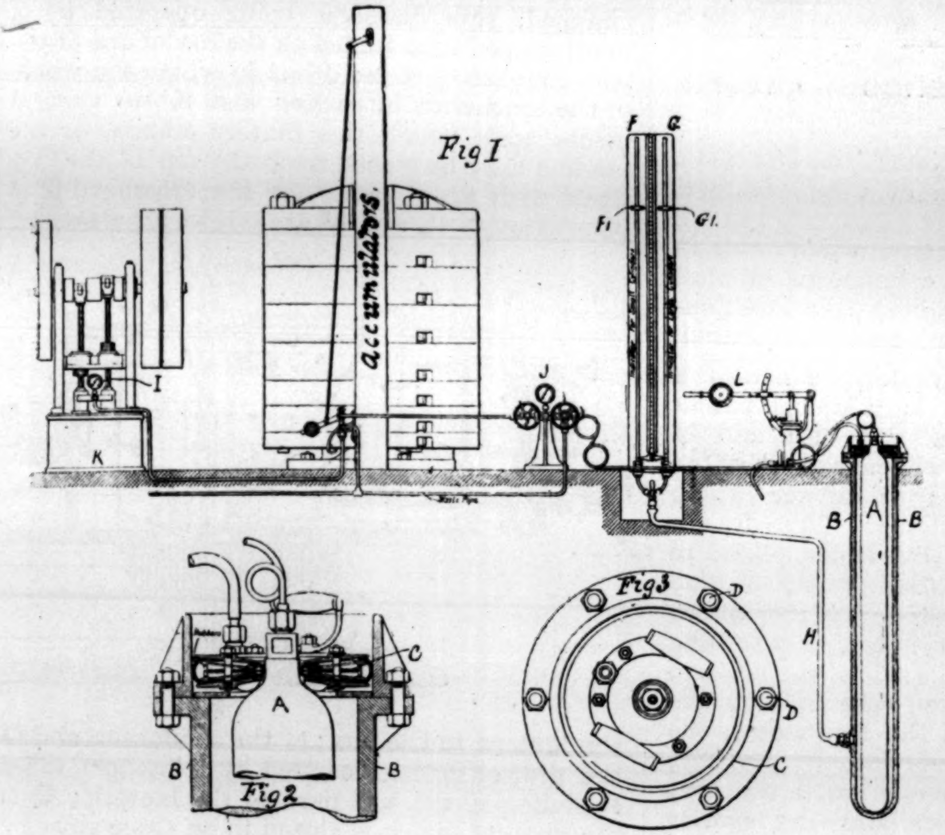


Fig. 1 gives a sectional view of the entire apparatus. Fig. 2 is a section of the envelope containing cylinder, partially shewn, with india-rubber collar in detail, and Fig. 3 is a plan view of annular collar showing bolts and nuts for making fast to envelope.

A cylinder (A) to be tested is filled with water and placed in the envelope (B), which is also full of water, and the collar (C) fastened by bolts (D). The rubber collar is then inflated by allowing the water into it from the fixed head of water, or accumulated until a perfect joint is made. The more pressure there is put into the collar the tighter it becomes around the neck of the cylinder.

The action is similar to that which takes place in the collar fitting round the ram of an hydraulic press.

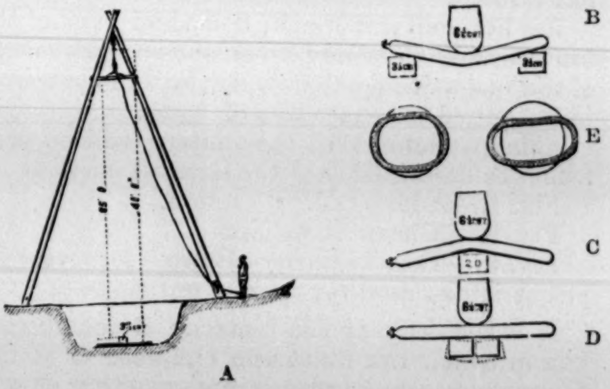
The expansion of the cylinder is measured by displacement of water in the envelope (B), which is connected to gauge glasses (F) and (G) by pipe (H), and the pressure in the cylinder is indicated by pressure gauges (I) and (J). There are two gauge glasses, one for large and a second one for small cylinders.

So soon as the pressure in the cylinder is increased the water in the glasses (F) or (G) immediately commences to rise, and continues to do so until the maximum pressure is reached, and on release it falls again with good cylinders to its original position, showing that the elastic limit of the metal has not been passed and the cylinder in no way damaged.

(F1) and (G1) are moveable slides for registering displacement, (K) hydraulic pump, (L) hand pump.

The following illustrations show the methods adopted in experimenting with cylinders to test their stability under extreme conditions of rough usage.

Fig. (A) is a derrick with which the weight or cylinder is raised to about thirty-five feet, and then released and allowed to drop. In all cases the bottles were filled with gas to the standard



pressure, and after being experimented with were found to contain the full quantity of gas. (B), (C) and (D) shew the methods of supporting cylinders and dropping the weights upon them. (EE) are sectional views of cylinders after experiments, the thin plain lines are the original forms of same, and the shaded lines shew the amount of flattening that occurred during the trials.

——:o:——

Magazine and Science Lantern.

The first paragraph in "Notes" of last issue, in which we made mention of a new lantern, has brought us many letters of enquiry; these, however, there is no necessity to deal with in the "Notes and Queries" column, for all that we have at present to say about this ingenious lantern will be given in this part of the journal.

Mr. Allen being the inventor, he names it after himself and styles it "Allen's patent magazine science lantern." By the aid of the following drawings it will be seen that the slides are put into a box or drawer which contains a series of partitions. This drawer after having been charged with slides, placed of course upside down, is pushed drawer fashion into a receptacle in the lower part of the lantern until No. 1 is seen on the index. By turning the handle once round at the side of the lantern, the following movements take place, the opalescent shutter behind the lens closes, the slide just exhibited descends into its division, the drawer is racked along one notch, the next slide pushed up into place and the shutter opened. All these movements take place very quickly and everything acts with dead certainty; and, as we said in last issue, we went through all the movements of showing the whole fifty slides in the short space of thirty seconds without a hitch.

For horizontal work the body and front of the lantern may be swung up as shown, quite clear of the magazine portion, which latter is of course not required for that class of work.

The particulars of the lantern will be seen from the descriptions of the lettered portions:—

Fig. 1.—A longitudinal section.
Fig. 2.—A back elevation.
Fig. 3.—The lantern shown for vertical projection as used for science purposes.

A is the body of the lantern; **B** rectangular box in which the magazine chamber **C** slides; **D** revolving cranks placed one on either side of the lantern for operating the ascent and descent of each slide and bringing forward the magazine chamber; **E** crosshead and plunger for lifting the slides, and **F** a projecting arm on the top of vertical guide rods attached to the crosshead below, which pushes the slides downwards and back again into the magazine chamber; **G** index figures for denoting the number of the slide in position; **H** celluloid screen for falling in front of the slide while the latter is being changed, this dissolver being operated by a hook shaped arm **I** fixed to the top of one of the side connecting rods; **J** box in which the whole of the apparatus is packed, and **K** are vertical struts upon which the lantern stands, or the lantern may be placed upon the top of the box itself with an aperture for the crosshead **E** to pass through; **L** and **M** are screws for attaching the lantern to the box; **N** the condenser, and **O** the projecting lens carried by telescopic tubes **P** sliding in the top part of the lantern; **Q** is the lime jet which is closed in on three sides by a flame and heat excluder **R**, the heat being conveyed outside; a rod **S** is attached to the heat excluder by which it can be manipulated, so that the operator may get at or examine the lime at will; **T** is a combination of mechanical movements for regulating the position of the lime and jet from the exterior of the lantern; **U** a small curtain supported upon sliding rods **V**; **W** a spring arrangement for holding ordinary slides when necessary; **X** the ratchet arrangement operated by the cranks **D** for causing the magazine or reservoir chamber **C** to advance as each slide is to be manipulated; **Y** the handle for manipulating.

Fig 1

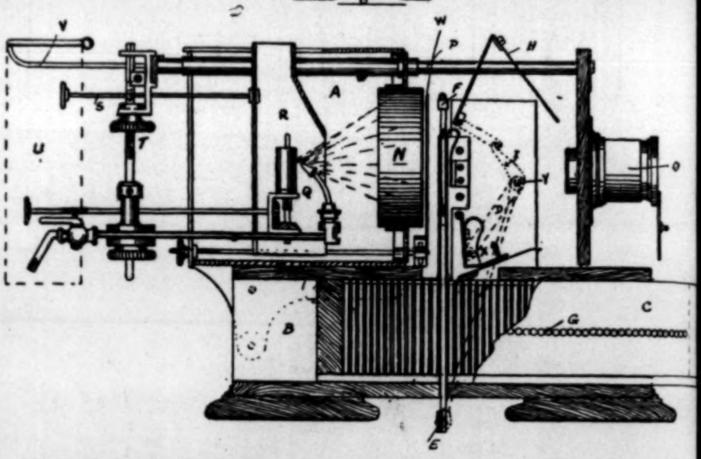
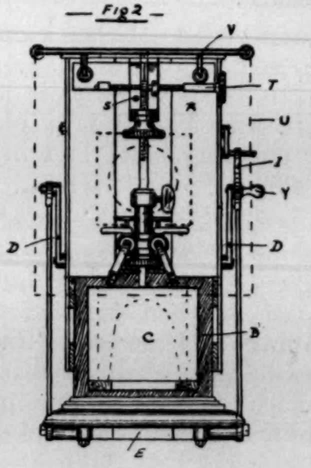


Fig 2



We learn that arrangements have been made for the manufacture of this lantern in great numbers. The name of the dealer, prices and other particulars will be found among our advertising pages in a short time.

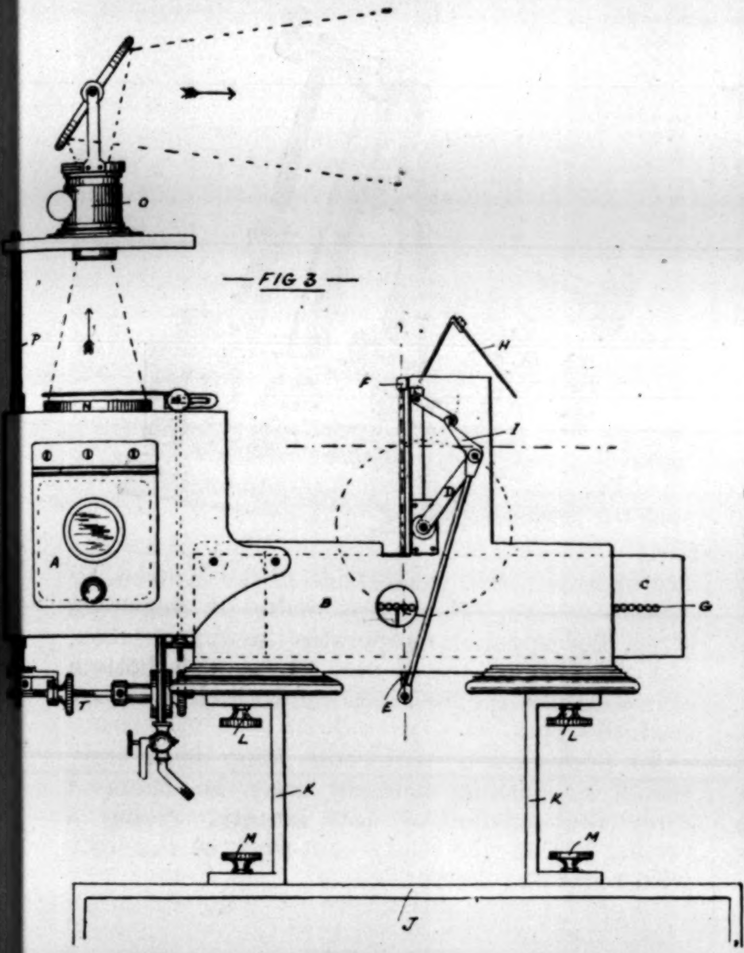


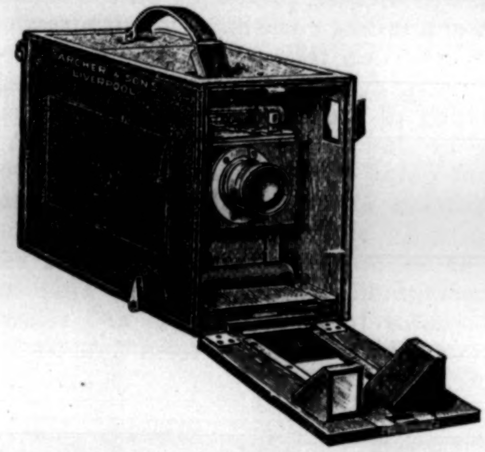
FIG 3

Hand Cameras for obtaining Slides for the Lantern.

No. 34.—THE "TOURIST."

The "Tourist" hand camera, the product of Messrs. Archer & Sons, of Lord Street, Liverpool, has had various improvements added to it. Messrs. Archer, finding that many of their patrons prefer dark slides instead of magazines, and as they insist upon the dark slides being contained inside of the camera itself, they will doubtless be pleased with this instrument, for it is arranged to carry six double slides (¼ plates), which are kept packed together in the end of the camera, the shutters being of xylonite.

For ordinary distant shots, this camera may be used as any other hand camera, by setting the focus accordingly, but for close work it may be focused as desired, by turning a thumb screw placed outside, which actuates a pointer travelling on a scale marked with various distances.



Having in this Journal referred to the Thornton-Pickard shutter, our readers will be aware of its excellence; this camera is fitted with one of these, which, with a good rectilinear lens is fastened to a rising front. On the lens tube, which is fitted with "Iris" diaphragm, is engraved a focusing scale.

By means of flushes let in the side and bottom of the camera, it can be attached to any camera stand.

The instrument is of polished mahogany as regards the inside and is covered with morocco leather; the size is 11 by 6½ by 4¾ inches and the weight about 4 lbs.

—:o:—

New Apparatus.

Curtain Slide and Panoramic Carrier.

It is invariably the aim of the lantern operator to endeavour to make his share of an entertainment go as smoothly as possible. To this end Mr. Davenport of the Society of Arts has devised and patented a curtain slide carrier.

The carrier employed is a panoramic or "push through" form, and will fit any ordinary lantern. It is made to hold four slides of English standard size (3¼ × 3¼) at the same time, and is provided with stops and guides for centering the slides. A stop is fitted for quarter plate (American and Colonial slides). A moveable catch is fixed to the end of the carrier which prevents the fourth slide from being pushed along until the first slide, already exhibited, has been removed, accidents from falling and broken slides are thus prevented. In the upper part of the carrier is a groove in which a rod or runner works to and fro. To this rod is attached by cords a curtain running vertically in guides on each side of the opening, and so arranged that when the rod is pushed along, the curtain is raised so as to cover the space opposite the condenser, producing on the screen the effect of a falling curtain. On withdrawing the rod, the curtain falls and shows on the screen as a rising curtain. Between the falling and the rising of the curtain the slides are pushed along by hand, guided by the stops. An important point is that the movement for working the curtain effect is independent of that for changing the slides, so that the carrier can be used as an ordinary panoramic carrier without the curtain effect when desired. This enables the operator to vary the form and relieve the monotony of an exhibition from time to time.

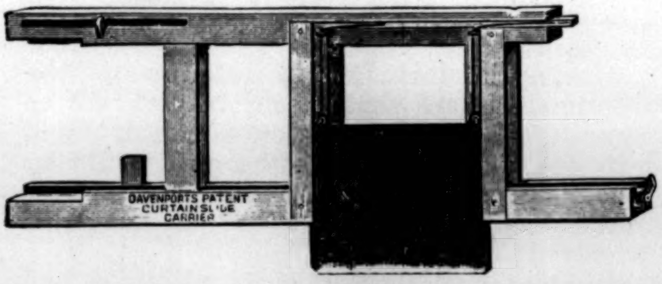


Fig. I.

The Carrier is made in two patterns as shown. Figure I. represents a simple form suitable for lanterns having open stages. The curtain in this Carrier consists of a metal disc, which falls by its own weight when the runner is withdrawn.

For lanterns in which the stages are closed, or otherwise constructed, the form shown in Fig. II. has been designed in which the curtain rolls up in the base of the Carrier and is unwound and wound up in a manner somewhat similar to that of a roller blind.

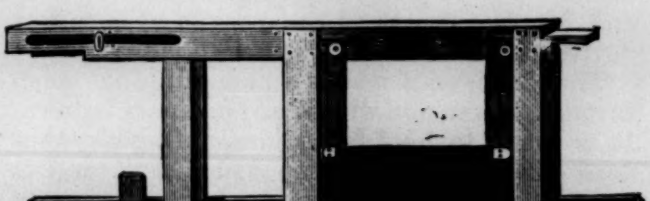
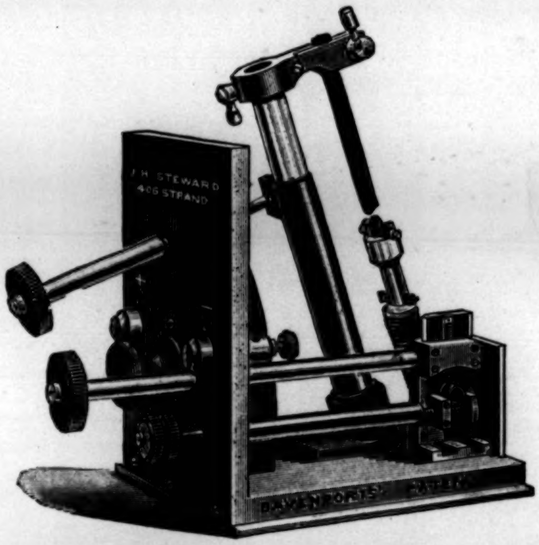


Fig. II.

DAVENPORT'S ELECTRIC ARC LAMP.

The following cut shows the outcome of the original Davenport Electric Arc Lamp, which we described in these columns some time ago. The new one has attachments for altering the vertical height of the lower as well as the upper carbon, also a means for enabling the slope of the bottom carbon to be varied if thought necessary. From the sketch it will be seen that the controls are operated from the outside of the lantern, by thumb-screws, which are made of vegetable fibre. The upper screw operates the upper carbon, the middle one the lower, whilst the bottom screw causes the lower carbon to incline to any desired slope.



In conjunction with this lamp is a tray, which by turning a screw may be operated from the outside of any lantern, giving a further aid to the ready centering of the light with regard to the condenser.

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A Cheap Apparatus for Copying Slides.

By T. Perkins.

On recently becoming a member of a photographic club for the circulation of slides of architectural subjects (one of the rules of which is that any member may copy any of the slides while they are in his possession), I thought it desirable to provide myself with apparatus by which this copying might be done quickly, as the time during which the slides may be kept is necessarily limited to a few days.

I had on previous occasions copied slides by fixing them in a frame sliding along a board on which the camera was placed, but as my camera, like the majority of those in use, was front-focusing, it was a tedious business to get the negative sharp and of the right size, so I resolved to construct a cheap copying apparatus, and as I have found it answer admirably I will give the readers of the Optical Magic Lantern Journal the details of the construction, although, of course, no novel principle is involved.

I resolved to use a Wray wide-angled rectilinear of 4$\frac{5}{16}$ in. focus—a lens that I use for half-plate negatives in the rare instances when I find it necessary to employ a wide-angled lens. As I wanted to make the negative copy of the slide the same size as the original, I knew that the approximate distance between the lens and slide and between the lens and sensitive plate must each be 8$\frac{5}{8}$ inches, so I procured a rectangular planed deal board 20 inches long, 6 inches wide, cut from $\frac{3}{4}$ inch plank by the village carpenter; also another piece of board of the same thickness with a central hole to take the lens flange. This I fastened by two screws at right angles to the long board, so that the diaphragm wheel was equally distant from each end of it.

I next took two ordinary $\frac{1}{4}$-plate printing frames, and removing the springs and back from one of these, I first inserted a mask cut from card, with an opening 3 inches square, and then I cut two strips of wood as thick as an ordinary lantern slide, which I placed in the printing frame so as to leave a little bed 3$\frac{1}{4}$ inches square, in which the lantern plate would rest comfortably, the card mask preventing any light creeping in round the sides; two little buttons, similar to those used on the dark backs of cameras to keep the shutters from sliding out, fastened to the strips above described, held the lantern slide tightly in the frame.

In the other printing frame I temporarily fastened a sheet of ground glass to act as a focusing screen.

Now came the only troublesome part of the work. Knowing approximately how far the slide must be in front of the lens, I set up the frame containing it on the long board, and at right angles to it, propping it up with paper weights. Then, holding the frame containing the ground glass in my hand at right angles to the base board, and of course parallel to the board carrying the lens and the frame containing the slide, I gradually moved it until I got sharp definition. A slight alteration was also necessary in the position of the slide to get the image the right size.

When I had the two in place I marked their positions with a pencil, and with two screws fastened the frame carrying the slide to the base board. Then, this and the lens board being now fixed, I once more carefully adjusted the position of the frame carrying the ground glass, but before screwing it in position I glued two strips exactly 4$\frac{1}{4}$ inches apart across the frame, so as to leave a bed just large enough for a quarter-plate to lie in, the strips preventing all light from striking the ends of the plate.

Little now remained to be done, thin boards, 20 inches long and 5 inches wide, were nailed along each side of the base board and fastened to the ends of the printing frames and lens board.

All the interior was then covered with dead black, and finally a board 14 by 6$\frac{1}{2}$ inches, previously blackened on the under side, was fastened at the top, making a dark chamber between the lens and the frame which was intended to hold the negative plate, but leaving a space near the frame carrying the slide, through which the hand can be put to screw or unscrew the lens, and to alter the stop if necessary. This aperture, when the apparatus is in use, is covered by a black cloth. Brown paper pasted along the joints and another sheet pasted all over the outside prevents any light from leaking in.

To use the apparatus, all that is necessary is first to fix the slide to be copied in the front, then in the dark room to insert the negative plate in the frame at the back; on this to put a pad of velvet, and over it the original back of the printing frame; to fasten this in with the springs, and then to turn this end downwards; to cover the slide with the lid of an old whole plate cardboard plate box, or with a dark cloth; to carry the whole apparatus into the open air, and setting it on the ground with the slide end uppermost; to make the exposure by removing the covering for the necessary time, and then to return to the dark room and develop the plate.

I find my camera thus made quite light-tight; should, however, it be found that any light gets in at the back, it is easy to wrap this end up in a focusing cloth. I should say that in adjusting the frames so as to get accurate focus the largest stop should be used, that is if the lens is one well corrected for spherical aberration, and then to stop down in use, in order to be able to make the exposure sufficiently long to be accurately timed; but if the lens is not well corrected it will be necessary to adjust the position of the frames before fixing them with the stop that it is intended to use. The stop marked $\frac{f}{22}$ is a useful one. Of course this adjustment must be made under a dark cloth, such as is used for focusing a view on the screen of a camera.

The cost of the apparatus described is trifling—say sixpence for the wood, sixpence each for the printing frames, to which must be added the cost of the flange (2s.) if one has not a spare one, as probably most photographers have who use more than one lens.

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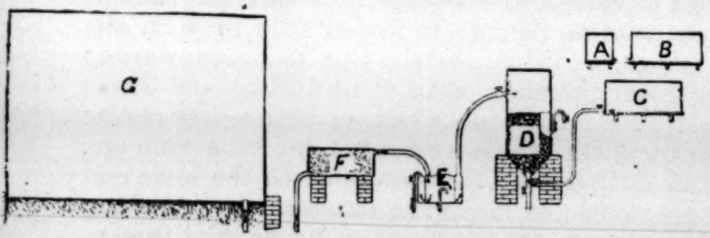
Hydrogen Gas Apparatus for the United States Signal Service.*

A HYDROGEN-GAS generating and compressing plant has recently been designed and built for the United States Signal Service. Its arrangement and design is clearly shown by the accompanying engraving.

A, is an acid-filling vessel of No. 14 B.W.G. sheet iron, lined with lead of standard weight, 6 lb. to the square foot, without the top, and holding 12 gal., with a $\frac{1}{2}$-in. lead outlet pipe from the bottom, with a lead faucet.

B, is a rectangular galvanised iron water vessel, with a capacity of 60 gal., with a 1 in. iron outlet pipe from the bottom, having a faucet at the end. This pipe is made so as to admit unscrewing it from the water vessel without leaving any outside projection.



C, is a rectangular mixing vessel of No. 16 B.W.G. sheet iron, lined with lead of standard weight, 6 lb. to the square foot, containing 72 gal., and it is into this that both A and B empty when the apparatus is in use. This vessel is made so as to admit the water vessel B to be placed within it for convenience of transport. It has a $1\frac{1}{2}$-in. lead pipe from the bottom connecting with the generator D, and a lead stopcock near the entrance to the generator.

D, is the generating vessel of No. 14 B.W.G. sheet iron, with riveted and calked joints, and is lined inside throughout, except at the top, with sheet lead of standard weight, 6 lb. to the square foot; it is a cylinder 4 ft. in height by 2-ft. in diameter, with a conical bottom forming a reversed cone 1 ft. in depth, having at the apex a 2-in. orifice with pipe, a joint or union, and having inside, immediately above this orifice, a movable perforated lead disc to uphold the filings of iron or zinc, and to permit of free passage of the water that has been acidulated with sulphuric acid; a 2-in. lead pipe connection is furnished for the orifice with two lead stopcocks, one for the inlet from the mixing vessel, and the other to carry off the flushings or waste when washing out the tank; the top of the generator is fitted with a round movable cover, is 22 in. in diameter, of sheet iron, the rim or sides of which is 12-in. wide, so as drop into an annular space 12-in. deep and 2-in. wide. This annular space, when in use, contains water to make a water joint for the cover, and is formed on the inside of the upper edge of the cylinder by riveting a band of sheet iron around the top so as to provide between the band of iron and the side of the cylinder for a space of 12 in. deep and 2 in. wide; this sheet-iron band is lead lined on its side facing the interior of the cylinder.

The generator is also fitted on the inside with a water-tight lead-lined bowl, being 14 in. deep and 6 in. wide at its top, for the purpose of carrying off the overflow—the top being level and 24 in. above the base of the perpendicular side of the cylinder. On the outside of the cylinder, 1 in. above the height of the bottom of the bowl, a 1-in. syphon pipe of lead is connected with its upper curve on a level with the top of the inside bowl, and having a faucet at its end to carry off the overflow. A 2-in. lead-lined outlet pipe (for hydrogen gas) leaves the generator just below the annular space — that is, about 13 in. below the top of the cylinder. It has a stopcock and a coupling for the pipe leading to the washer F.

E, is a gas-tight vessel (used for circulating water through the hydrogen to free it from impurities) of No. 16 B.W.G. galvanised iron, with riveted and calked joints; it is 24 in. in diameter by 15 in. in height. Inside this there is placed, and tightly jointed to the top and bottom, a concentric partition of the same material 4 in. from the side. This partition has a row of $\frac{1}{4}$-in. perforations 2 in. apart and $\frac{1}{2}$ in. from the bottom. Over the annular space thus formed, and in the top of the vessel, there is placed a union for the pipe connection with the generator D, and in the opposite side of the top, over the annular space, there is placed a connection for 1-in. pipe to admit water. Also in the top and over the inner or circular partition space there is fixed a connection for a 2-in. pipe for the gas outlet. Within the inner (circular) compartment, and at the centre of the bottom, a lead pipe bent at the upper end for a water overflow is inserted, the lower part of the bend being 7½ in. above the bottom of the vessel, and the orifice on the outside of the bottom is provided with a coupling for pipe or hose. In the centre of the top of the vessel a man-head, 8 in. in diameter, is placed; this is made fast and gas-tight with a gasket. A drain-cock is also provided at the outer lower edge of the vessel.

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* American Engineer and Railroad Journal.

F is a dryer of No. 16 B.W.G. sheet iron, with joints riveted and calked, and is such a size as to fit into the water vessel B for convenience of transportation. This dryer has a gas-tight movable man-head, 12 in. in diameter at the top, and has a connection for a 2-in. pipe, through which the gas enters, traverses the quicklime within the dryer, and passes out through a 2-in. exit pipe, the connection for which is also provided in the end of the dryer and on the opposite side from the entering pipe. Sheet-iron perforated partitions are placed inside and over the inlet and outlet orifices to prevent the lime entering the pipes.

G, is a cylindrical gasometer of No. 16 B.W.G. sheet iron, 12 ft. in diameter, of a capacity of at least 1,000 c. ft. of hydrogen at a pressure of ½ lb. to the square inch; it is made the same as for illuminating gas, and is provided with columns, weights, and all ironwork complete.

In addition to those parts shown on the engraving there is a hydrogen-gas compressing pump, with a capacity of 10 c. ft. of free gas per minute, and is capable of compressing 1,000 c. ft. of hydrogen gas to 101 atmospheres in 100 minutes, as well as compressing it to 121 atmospheres in two hours, and forcing it into steel storage cylinders. The compressor is capable of working under a continuous working pressure of 2,000 lbs. to the square inch; the parts of the pump and connections subject to great pressure are made of metal of such density as to prevent escape of hydrogen gas through its pores; great care was taken to have the machine tight in all its joints, and show no distress of working under test of 2,500 lbs. per square inch; the compressing cylinders are surrounded by water jackets; the valve mechanism is of improved construction, and particularly accessible for convenient examination and repair; it is supplied with a pressure indicator; an automatic (positive) regulator, with piping, making connection between the regulator and indicator. The gas is compressed dry—that is, no water is allowed in the compressing cylinders. The pump is driven by belt power, and is, therefore, provided with band fly-wheel for such an application of power.

Hints on Screens, and a Good Support.

By a Lanternist.

When first starting, some years back, as an operator, travelling from town to town on my first tour, I met considerable difficulty in many ways by having to contend against the various shapes and sizes of the rooms or halls where the lantern entertainment was to take place, to enable me to put up my sheet or screen in the manner that I considered satisfactory. At some places, the roof was low-pitched with a platform; in others, high roofed and no platform; and again, in other cases, the hall-keeper gave me precise instructions that no screw-eyes or nails were to be used in the walls. At times I must admit that I was fairly puzzled, and only once during the course of some five hundred shows have I been unable to erect a sheet at all, but on this occasion I used the blank wall end of the reading-room to the satisfaction of all concerned, and I managed that by raising the lantern and accessories by means of tables, so as to get the optical axis at right angles to the wall.

I will explain what has been to me a boon—the idea struck me one evening, after having packed up and retired from the hall to my lodgings. I was then a long way from home (down in the west country); I was sitting by the fire, thoroughly worried and thinking, and I imagined I could see in the fire flames all the various frames and supports with their advantages and disuses, with all sorts of names—"Ever-ready," "*Non-sag*," the "What is wanted," etc. Nearly all the frames in the market are somewhat expensive affairs, and the light bamboo ones are all very well in their way, but I have seen them in the midst of a lecture warp. Having thought out my idea, I jotted it down on paper before retiring for the night, and the following day being a vacant date, I proceeded on to the next town and found out a decent carpenter, explained to him my ideas, and we set to work at once; in consequence, we soon had a frame finished, which has proved to be a blessing and boon. It can, with hardly any trouble, be made to take from the large, down to the smallest sizes of screens.

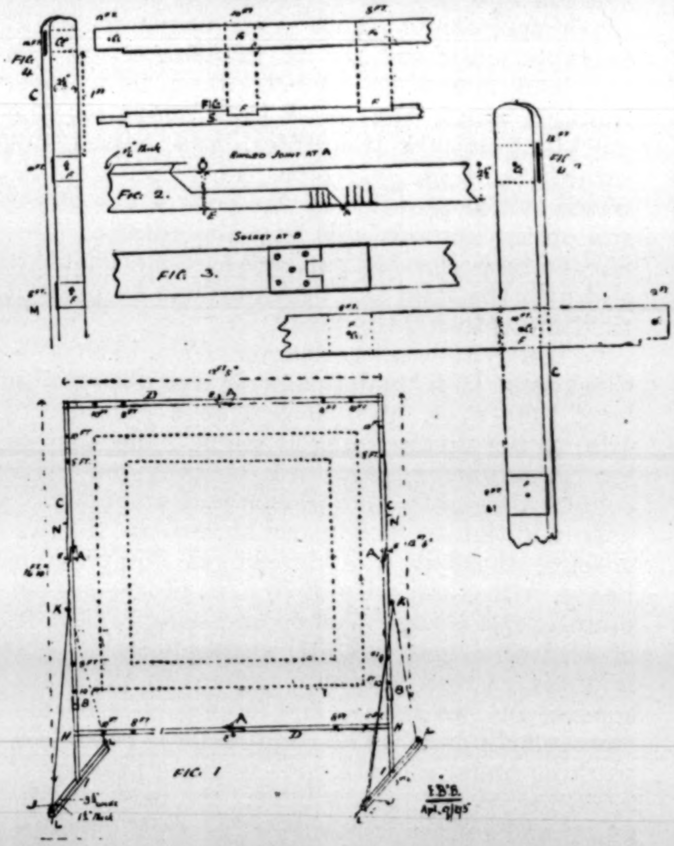
Before proceeding to make a frame, one must consider what size the largest sheet is that will be used, and from the largest size you can then base the principles of construction. I will in the following consider it as a 12 ft. sheet, which size I have found, through experience, to meet all requirements. I never use larger than 16 ft., but I find the 12 ft. the handiest, and so adapt my ideas to that size. Choose some fine grained deal, free from knots (this being important), of sufficient length to make the two upright supports (C), Fig. I., size 2½ in. by 1¼ in., and allow for cutting away at the hinged joint at (A); then take two more pieces for the top and bottom parts of frame (D), same size but shorter in length (the illustration of frame complete is drawn in correct proportion, and for reference will be useful on examination); carefully plane up all four sides in their full lengths before cutting same in halves, and slightly round the sharp edges.

Having proceeded thus far, saw the wood in halves, and make the hinged joint as shown at Fig. II., which is simply done, only make them fit well; put on a good strong iron flap hinge (A) with stout screws, and then take a thumb-screw (E) and let in the two brass plates, the one with the thread being, of course, on the hinged side; drill a hole to let the thumb-screw through the two pieces of wood when hinged, screw on the brass plates, put in your thumb-screw, and you have then a good strong hinged joint almost capable of taking any strain, always remembering when putting frame together the hinges must come on the inside or sheet side of frame.

Proceed with the other three lengths, and put on hinges and thumb-nuts. The correct lengths can now be cut, but allow two inches for the socket joint that is shown in Fig. III. at (B) and Fig. I. at (B) and (B).

We now turn our attention to the corner and shift joints (F), see Fig. IV., and by closely observing same, make two mortises in the top upright supports, two inches from top (size of mortise ½ in. by 2⅝ in.); cut both of these out cleanly, then tenon the top part (D) to fit into same; drill a hole ¼ in. through centre, as at (G), Fig. IV.; let in thumb-screw plates, screw them on and put in thumb-screw, the screw-plate being at the back. After the other top right hand corner of (C), Fig. I., has been completed, measure off 12 ft. 2 in. from this corner, along the upright supports (C) where the bottom rail of frame is to come in; mortise holes as before, ½ in. by 2⅝ in. each, at (H), Fig. I., and tenon the bottom part (D) to fit; drill hole ¼ in., put on plates, screw them down, and put in thumb-screws. We have thus far a 12 ft. frame complete.

The two legs are 3 ft. 6 in. long (same kind of wood), 3½ in. wide, and 1½ in. thick; find centre (I), Fig. I., mortise 1 in. square hole on each, and at bottom of uprights (C), Fig. I., make a 1 in. tenon to fit same. In my frame I have holes at (J), Fig. I., so the support (C) can be put in there should one not be able to place screen up close to the wall, in case there are desks or forms in the way. Having put in two stout screw-eyes 6 ft. from bottom as at (K), Fig. I., and one each at end of leg at (L), and with some good strong life-line or cord of 14 or 15 ft. fasten the cord half way at (K); bring them down through (J) and put on the ordinary tent line fastening, or securely tie them at the screw-eyes at (L). By means of these cords the frame can be set at almost all workable angles without any fear that the whole is going to fall or topple over.



Let us now proceed to take the frame to pieces, and make it answer the purpose of a 10 or 8 ft. frame. It will be noticed that the small black parts marked 10 and 8 ft. in Fig. I. are shown in larger detail at Fig. IV. at (F). Measure off on the uprights (C) 1 ft., and cut out on face, ⅝ in. deep and 2½ in. wide, to allow the top (D) to fit into it, and cut in the same way

1 ft. down at (M), Fig. IV.; these are what I call the 10 and 8 ft. respectively. Cut out top (D) as shown at (F), Fig. V., to allow same to go in at upright (C) at (F), Fig. IV., when in place, as at Fig. IV. (2), and crossed; drill ¼ in. hole, put the brass screw at back, other plate on front, and put in thumb-nut. Proceed to do this at all the places on Fig. I. marked 10 and 8 ft. I find in Fig. I. I have, unfortunately, made the bottom (D) where it is mortised into upright at (H) 1 ft. too low down in the sketch. This would not really matter if it were made so as the sheet could always be laced or stretched up with cords or tapes. I use both myself. You will now find that on laying these out at either the 10 or 8 ft. corners, it will give a square frame, which when screwed together is capable of taking any strain that may be put upon it as far as sheet stretching is concerned. At (B) in Fig. I. I have a joint, as shown better in Fig. III. It is made by mortising 1 in. square hole in bottom part, and tenon the other to fit. I have a brass socket piece screwed on as at Fig. III., and I found this answer all the purposes for a safe joint. I had this so that when using the 10 or 8 ft. sheet, I can, if I choose, or circumstances would not permit, do without the parts (H) at each side, and let the bottom instead of going into sockets go into legs (I), Fig. I.; but in this case, put in two more screw-eyes at (N) on each side Fig. I.

I have frequently used the whole frame for a small sheet, with the 8 ft. corners crossed so that the bottom of sheet does not come in the way of the shadows from the heads of the audience, which would be cast if placed lower down. Once you grasp the idea of this frame, it can be made in a very little while with little trouble in comparison with its after uses. It can easily be taken down, and the thumb-screws used for holding same kept together, but I always take the precaution to carry one or two extra thumb-screws, and I have two large leather buckle straps, which holds the whole together securely when buckled up at the ends. When you have once put the frame together in right order, mark the parts so that you can easily tell which way they go again, which you will find very convenient.

I might here add a few lines upon sheets or screens. The best for travelling purposes—I carry three or four, and have a box made to hold them all with their tapes, etc.—is of a linen texture, perfectly white, very thick and strong; the thickness gives it opacity, and its strength prevents all risks of splitting. The sides and corners should be strengthened with an extra linen binding and flattened out with brass eyelet holes. Always hang or support the screen at a sufficient height to clear the heads of the audience. When you tilt the lantern at an angle, the sheet should also be tilted at a corresponding angle, or the picture will be out of focus top or bottom. When the sheet is tilted, always take care that it is perfectly taut, or you will find that it will sag in the middle. In stretching the sheet try and keep the seams perfectly straight, or if you do not, you will find them pucker all round them. Never damp your sheet unless it is absolutely necessary, as it takes all the whiteness out of the material, and cannot again be recovered by ordinary washing, but only through a special process.

I must now bring my remarks to a close, hoping that those who have had any difficulty in the past, will, before next season arrives, try this idea.

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Acetylene.

By W. H. Harrison.

The approaching advent of cheap acetylene made "a flash in the pan" in the lantern world, and now seems to hang fire, for two reasons. The one is, that the American manufacturers have not yet put calcic carbide on sale in small quantities to suit small purchasers, nor is it certain that they intend to do so; the other, perhaps, is that the acetylene yielded by electrically manufactured calcic carbide is not pure.

The latter point does not yet seem to have attracted the attention of the photographic press in this country. Mr. Willson makes calcic carbide by submitting finely powdered lime and coke, intimately mixed, to the heat of a powerful electric furnace; the sulphur in the coke finds its way into the calcic carbide, and thence into the acetylene produced therefrom by submitting the carbide to the action of water. The question therefore arises, whether the sulphur in this impure acetylene intensifies its already abominable smell, for sulphur in volatile hydrocarbons usually has a powerful influence in that direction. Take for instance, assafœtida, oil of mustard, oil of horse-radish, mercaptan, house gas before sulphur is largely eliminated therefrom, and a host of volatile substances. The firm which probably keeps in stock the largest miscellaneous variety of chemical substances in this country, was once asked by us what was the most evil smelling thing they had on the premises, and the reply was "mercaptan." A few bubbles of acetylene gave the meeting room of the Camera Club the smell of what Professor Vivian Lewes described as that of "rotten onions with a dash of garlic," for the whole evening; even when it softened down so as to be hardly recognisable by those present, it became strongly evident to those who freshly entered the room from the outer air. Did the penetrating pungency of the smell owe something to the presence of the sulphur impurity, if so, how much?

There is no doubt as to the useful brilliancy of the light for lantern purposes, and the certainty that it will drive oil out of use as a lantern radiant, should there be no drawbacks in the matters of price and smell, and absence of compressed gas bottles; but, unfortunately, the public at present cannot readily obtain acetylene to solve doubtful points for themselves. A trained chemist has no difficulty in making it, or anyone who is clever at fitting up glass chemical apparatus and tubing. Perhaps the most readily accessible instructions for making it in the old-fashioned, common way, are in that popular book, "Bloxham's Chemistry, Churchill's, London, 1867," which contains nearly three closely printed pages on the subject, with an engraving of the joining up of the tubes, and flasks for its manufacture. The particular method employed is that of producing it by burning a jet of common air in an atmosphere of coal gas. An "adapter" of the form of a paraffin lamp glass is supplied with coal gas through a cork in its top, and with common air through a short piece of brass tube in a bung at its bottom; the products of combustion come out down a second tube in the bung at the bottom, and are caused to bubble through a solution of cuprous chloride, which separates the acetylene, and precipitates it as acetylide of copper. From this, pure acetylene is separated as required, by treating it with strong hydrochloric acid, and applying moderate heat.

Some little care has to be taken in these operations, for one does not want to blow up the paraffin lamp glass by an explosion of mixed common air and coal gas. The coal gas is first turned on into the top of the lamp glass, and when all the air is supposed to be expelled therefrom, a light is applied to the lower opening of the brass tube in the bung, and the air begins to burn as a jet inside the adapter. A smaller brass tube is then pushed up the larger one, through which a feeble current of air is kept steadily passing to feed the flame, which goes on burning for hours with a little occasional attention to the proportions in which the gas and air are supplied.

The acetylide of copper, a red precipitate, when collected on a filter, washed and dried, explodes with some violence if gently heated; it is better kept in a damp condition. Workmen have sometimes been injured in a mysterious way by explosions which took place when they were blowing the dirt out of old brass gas pipes, and it is supposed that these explosions were due to acetylide of copper, which had accidentally formed. Acetylene also forms an explosive compound with silver. When the gas is passed through nitrate of silver, the acetylide is thrown down as a white, curdy precipitate; it is more dangerously explosive than the copper compound. It may be hammered without exploding, but a minute fragment of it goes off with heat almost like fulminating silver.

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A Talk on Condensers and Lenses.

By C. Goodwin Norton.

There is much misconception regarding the functions of the lenses of a lantern. These are often described as being very powerful, by which we suppose is meant that they produce a large picture, or that they greatly magnify the light. No lens of any description really magnifies light, and the size of the picture depends mainly upon the distance of the screen from the lantern. All that lenses do is to bend or refract the rays of light on to certain points. Rays of light proceed in straight lines, while the transparent medium through which they pass is of one density, such as air; but should the density be changed they are bent or refracted at an angle more or less acute, as the new medium varies in density, but always towards the thickest part. A simple experiment will illustrate this; place an ordinary basin with a shilling in it on the table, step back until the shilling is obscured from view by the edge of the basin; now if water is poured into it, the coin will come into sight without any movement of the latter or on the part of the spectator.

Rays of light are invisible, but their direction can be seen when their progress is partly intercepted, as, for instance, when they pass through smoke, a cloud of dust, or a London fog, and it is by this means that we are enabled to ascertain in some measure whether any of them are likely to be wasted.

In the optical lantern there are two lenses, or to be more exact two sets of lenses, the condenser and the objective. The work of the condenser is to collect as much of the light as possible and direct it through the lantern slide on to the objective, which will form an image on the screen.

The diagram, Fig. I., will give an idea how this is effected.

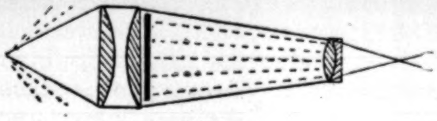

Fig. I.

It will immediately occur to some, why have two or four lenses since one will bend the rays in the direction required if it be of the proper thickness.

Lantern lenses are made in more than one thickness for several reasons, on account of chromatic aberration, this arises from the fact that light is composed of seven colours, viz:—violet, indigo, blue, green, yellow, orange and red; these cannot be made to refract at the same angle by any one lens. This produces a fussy appearance of the picture on the screen, and the various colours are to be seen near the margins. Chromatic aberration formerly caused great trouble, as it was apparent in all optical instruments, more especially telescopes and microscopes, until in 1825 Mr. Dollond discovered that by using two lenses of different refractive powers, such as those made from crown and flint glass respectively, placing them together, it was possible to produce a compound lens which would not show the prismatic colours, or in other words correct the chromatic aberration. This division of light is not an unmixed evil, as the rays represented by the colours have two distinct uses. The violet, indigo, blue, and green give little or no heat, but they act chemically upon many substances, particularly upon the salts of the metals. The other rays, yellow, orange and red, act exactly the reverse way; but for this we should have no photography as now practised, and consequently few lantern slides.

Spherical aberration arises from the inability of the lens-makers to produce a lens which will bring all rays to a particular point desired, and this difficulty increases proportionally with the thickness of the lens or the measure of its refractive power. The effect of this is to make the picture appear indistinct, either in the centre or at the edges, and sometimes all over. Lanternists who are also photographers will probably ask, why not cut off the rays which cannot be brought to a focus, as with photographic lenses, by using a diaphragm or stop? Such would mean a serious loss of light which cannot well be spared. This cutting off of the outer rays, or stopping down as it is termed, is of little consequence when taking a photograph, as it can be compensated for by lengthening the exposure. There is one other kind of aberration or distortion, known as curvilinear distortion, it is present in all single or achromatic lenses, and causes the lines near the margin of the picture to be curved. All these defects can be rectified by adding another lens, except in the case when the combined focus is very short, say three or four inches.

Lantern lenses have improved very much during the last ten years, and we may shortly expect even this difficulty to be entirely overcome by the makers.

Condensers must be made of two or three lenses on account of the heat produced by the illuminant, which would certainly break the glass were it abnormally thick.

Lenses are not made haphazard, *i.e.*, a workman is not given a piece of glass and told to make it into a lens of a certain focus. There are mathematicians who can design the curves of a lens with a precision that will be correct to two or three decimal places, or within $\frac{1}{1000}$ part of an inch, and the mechanic can with his tools grind to this degree of accuracy; but neither he nor the mathematician can tell exactly what the refractive powers of a lens, or rather of the glass may be, until the work is finished, and should it not produce the result expected it must be placed among the cheaper qualities or re-ground and re-polished at an expense equal to or perhaps exceeding the cost of the original work. This, apart from faulty design or bad workmanship, is really the difference between a good lens and a bad or indifferent one.

From what has been stated one would suppose it an easy matter to decide upon which is the best form for a condenser, but scarcely any two makers agree on this point.

The patterns in common use are:—(A) Double plano-convex. (B) Meniscus or moonshape and plano-convex. (C) Meniscus and bi-convex known as the "Herschel." (D) Plano-convex and crossed lens (Dalmeyer's pattern). (E) Triple condenser.

The curves are exaggerated to make the distinction clearer, and the place for the light is supposed to be in each case on the right.

In theory the one lens forming the half of a condenser, which is nearer the light, collects the rays from a point, makes them parallel, and transmits them to the second half which condenses them on to the objective, as shown in Fig. I. It will be seen that the nearer the light is to the condenser the more rays will be included; but the light cannot be placed much closer than three inches on account of the heat, which would crack the glass, also because of the spherical aberration resulting from the thick glass necessary to parallelize the rays with such a short focus.

The form (A) does very well when the light is large, as from an oil lamp, and the objective placed comparatively near; and it is the cheapest effective pattern that is made. (B) is more suitable for objectives of longer focus, the concave form lengthens its focus, gives it greater depth, and is supposed to collect a little more light than the plano of (A) Fig. II. (C) is a still better form for long focus objectives, its only disadvantage being that its outer curve is liable to get scratched by the slide-carrier or rolling curtain. (D) nearly resembles it in outward appearance, but the outer curve is flatter which decreases the spherical aberration, and as made by Dalmeyer this condenser is a much superior instrument to many generally sold, as indeed it ought to be, considering its relative price. Many authorities recommend the use of triple condensers, and for this reason it enables the first lens to be made much thinner and less liable to break from the heat; the light may therefore be placed as near to it as two inches. The danger of breakage is lessened by the intervention of a piece of glass which in some measure acts as a shield to the lens. A triple condenser certainly transmits more light than a double one, but it is an open question whether the gain in the light is worth the extra expense, especially as they have to be made larger to get the best results.

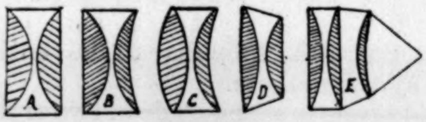

Fig. II.

The length of focus required in the condenser is in direct ratio to the focus of the objective, *i.e.*, the longer the focus of the objective the longer must be that of the condenser. Lanterns are often supplied with objectives of several lengths of focus to enable the operator to show different size pictures without moving the lantern. In theory the condenser should be changed each time, but in practice if the focus of the condenser is suitable for the longest focus objective it will answer fairly well for the shorter ones, but not *vice versa*.

The proper size of the condenser has no relation to its focus, but depends upon the size of the lantern slide. If the condenser is too large much light will be wasted, and if too small the whole of the picture will not be shown.

Lanterns are generally fitted with 4 in. condensers, and these would be large enough for the square openings in lantern slides, measuring $3\frac{3}{4}$ in. from corner to corner, if they were placed close to the condenser and exactly centered; but as we shall presently see it is one of the difficult things in lantern manipulation to do this, and, further, there is the thickness of the slide holder, and in the case of double and triple lanterns the rolling curtain; both of these require a certain amount of space which necessitates the slide being placed nearer the smaller end of the cone of rays, consequently its corners are often cut off. It is therefore advisable in the case of double or triple lanterns to have $4\frac{1}{2}$ in. ones, and there is little or no objection to this size in single lanterns, especially as many are now made which permit the slide holder and objective to be moved away from the condenser and so enable the whole of the available light to be utilised. It will be seen from Fig. III that at least $\frac{1}{3}$ of the light collected by the condenser is wasted; there seems no help for this except to have circular pictures, but these do not suit all subjects.

The Objective. The use of the objective is to take up the rays after they have received the image of the picture and bring it to a focus on the screen. In the early days of the lantern this was done, or attempted to be done, with a single lens, and when a short focus was required two or three of these were placed close together with a diaphragm or stop in front (Fig. IV.) There are several objections to this form, no single lens can be made to project straight lines near the margin, and unless the focus be long the spherical aberration is very great, whilst the stop used to lessen this cuts off much light. When painted slides were produced by the artist without the aid of photography he could compensate for the curvilinear distortion by making the lines of the slide curve in the opposite direction but except with the best class of hand-painted slides sharpness of definition was not a thing to be desired.

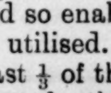

Fig. IV.

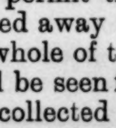

Fig. III.

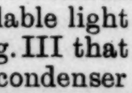

Fig. V.

Now that the majority of slides are produced by photography, and it is necessary that the picture shall be sharply defined all over, the single lens is or will be discontinued except for objectives of long focus, when a single achromatic answers about as well as the more expensive double one. The form of objective now in general use, and by far the best, is that of the Petzval portrait lens, as shown in Fig. V. This was designed to pass a large amount of light with the shortest possible exposure in the days when the actual taking of a photograph occupied fifty times as long as it does now. In lantern work a lens of this description can be used with full aperture, *i.e.*, without any stop, and as it can be constructed to give a flat field, the picture will be in focus all over at the same time and sharply defined. But the same lens will not answer for taking a photograph, because the visual rays, or those seen upon the focusing screen and the chemical ones which act upon the salts on the plate, are not coincident unless made so by the lens maker, and this operation is liable to interfere with the flatness of the field; especially as a lens for portraiture is not required to give a very flat field. Therefore it may be assumed that a portrait lens will not do well for a lantern, and neither can a good photograph be taken with a lantern objective if the best results are expected. Should the lenses of the objective be taken apart for cleaning purposes, the greatest care must be exercised to return them in their proper order, or the definition will suffer. The curves in Figs. IV. & V. are exaggerated to more clearly show their correct positions.

In the better class of condensers and objectives the different lenses are loose and secured in their places by screwing a ring down on the top of them. The cheaper qualities are spun in by the thin end of the mound being turned over their edges, which keeps them permanently in position. If the lenses are properly mounted the latter is the better plan, except in the case of the condenser lens nearest the light. It is often possible for the amateur to improve upon the work of the lens mounter; for instance, the definition of a lens of portrait form may be considerably improved by readjusting the distance between the two lenses of the back combination, or the one nearest the light. This can be readily done by bending a strip of card into the form of a circle, and putting it in the place of the metal ring which separates the two lenses; when the best results are obtained this temporary ring can be replaced by a metal one.

There is as much difference of opinion with regard to the proper size of the diameter of the objectives as there is about the shape of condensers, the larger it is up to a certain point the greater will be the amount of light passing through it, as the condenser never does bring all the rays to a point, as it ought to do in theory; on the other hand the greater the diameter of a lens the more difficult it is to construct and consequently more expensive. A lens two inches in diameter may cost five shillings; the same quality, four inches across, would be valued at something like twenty-five shillings.

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Editorial Table.

Benetfink's Catalogue.—This time last year the catalogue issued by this firm (89-108, Cheapside) numbered 16 pages, and yet contained particulars of a good assortment of apparatus. The new catalogue just to hand contains 64 pages giving a choice selection of the cameras, stands, lenses, lanterns, and sundries made by various firms.

Wood Bros., Liverpool, Catalogue.—This is a thoroughly up to date list of apparatus and appliances, and at their premises at 73, Lord Street, Liverpool, a good stock is kept.

The Eastman Photographic and Materials Company, 115 and 117, Oxford Street, W. have commenced the issue of an eight page monthly, *The Kodak News* the first number of which is before us. Kodakers as well as others will find much interesting information in this new paper.

Exposure Labels.—From Geo. Wheeler & Co., 46, King Street West, Manchester, we have received a neat book of gummed and perforated labels marked "Not exposed No..." These are for attaching to the edge of dark slides after filling. After exposure, the word "not" may be crossed out with a pencil or torn off.

Cyclopædic Photography.—Received just before going to press, and will be noticed in our next.

—:o:—

Correspondence.

BAGS *v.* CYLINDERS.

To the Editor.

Sir,—Your correspondent "The Showman" is very unwise in saying a word against the safety valves of retorts in making oxygen, as I have known even a bigger pipe than half inch choked by a rush of gas and *debris*. I should certainly advise—Never use a retort which has no safety valve. More than one sad accident has happened from this, and they are no nuisance in any way if properly constructed. The question of Bags *v.* Cylinders is being practically fought out, and will no doubt be decided by the majority of lanternists in favour of the latter. I, for one, kept on using bags long after the advent of cylinders, but I should not care now to go back to them, although they have one thing in their favour if properly weighted, and that is, the flow of gas is steady, and does not need the continual regulating the cylinder gas does.

Very truly,
HENRY W. TAUNT.

Oxford, May 3rd, 1895.

CONVENTION AT MONTREAL.

To the Editor.

We hold our U.S. Photographic Convention in this city, commencing August 6th, 1895. Anything I can do for you at that time I shall be pleased to do. If any of your friends wish anything taken care of, or represented at said convention, my services can be obtained.

I am, yours fraternally,
JEX BARDWELL,
93, Cass Street, Detroit, U.S.A.

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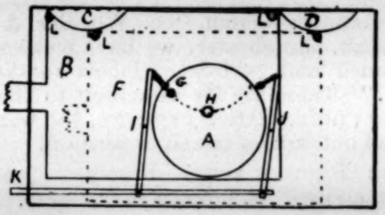
Notes and Queries.

J. Brown Scott writes:—I want to hit upon some method of showing on the screen by means of the lantern the "Black drop" seen during the transit of Venus. Of course it is possible to devise a complicated rockwork slide to exhibit the effect; and, as a matter of fact, one was made at considerable cost for the old Royal Polytechnic. Its mechanism has always been kept a secret; but I have reasons for knowing that it is purely *Mechanical.* The problem is, how can this be shown on the sheet to an audience? If possible, I want some contrivance which will enable it to be done as a part of an astronomical entertainment, and, therefore, with ordinary projection apparatus. I imagine, that if it can be done at all, one lantern only will be used. If you can think of any dodge by which the effect can be shown, I shall feel extremely grateful to you for information. *Ans.*—We do not as a rule give sketches in this column, but will make this the exception.—Would something like sketch answer with single lantern. A, sun, B, glass slip with Venus G provided with two bearings L L, resting on C and D, F is position of glass slip when Venus is at H, I J, levers attached to K to represent the drawing in of the sun. With a bi-unial lantern the pear-shaped effect at the junction of drawing in of sun and venus could be more perfectly rendered.



A. B. Spawforth.—We find that a letter of yours of February 14th has got mixed with other papers, and the following query was not answered:—What actual loss of light is sustained by using 4½ inch condensers (ordinary double plane convex) instead of 4 inch, for instance, if the light transmitted by the 4 inch is 100 °/ₒ, what per centage would be lost by using a 4½ inch one? *Ans.*—If the foci were about the same, there would be no difference.

P. H. Grandon, Jersey.—We have communicated with the steamship company, and learn that they will not carry cylinders, filled or empty.—You could use the form of gasometer for a triple if you made the tube of sufficient diameter to give the necessary pressure. If you want to cap the tube so as to get rid of the upper weight of water for moving purposes, you can screw a cap on the tube D (see sketch on page 58), and empty the top reservoir, and refill it when again using it; but you cannot remove any of the water from the lower reservoir. Be sure that the tap A is closed. (2) We cannot give you the name and address of the writer of the article; but if you send us a stamped letter with his *nom de plume* we will forward it to him, and if he communicates with you, then well and good.

G. H. Philp writes:—In your Journal for January, 1894, there is mention of a pair of lanterns with 24 inch condensers. Owing to the humorous, and half-chaffing style of the article in question, I should like to know if it is meant to be taken seriously, and is it an absolute fact that a pair of lanterns with 24 inch condensers were once ordered and constructed. *Ans.*—The order for the large lanterns was given, and the whole thing is a fact, but although the lantern, &c., was duly completed, we understand that the condenser portion was never finished, although several castings were made, for they were somewhat imperfect. However, after a great deal of money was spent upon it, the apparatus eventually found its way to the auction rooms of Messrs. Stevens. The further history cannot be traced with absolute certainty, but rumour says, the holes for the condensers were cut out to the base, and that they made excellent kennels for a couple of large Newfoundland dogs.

A. H. Whilcher (Ottawa).—(1) It is well to trim off the extreme corners of the wicks, but from your sketch yours seem overdone. It is not necessary to trim them to this extent, notwithstanding the fact you received them thus from the maker in England. (2) Newton's transparent screen is made of fine cambric, and can be used dry before it has visited the wash tub, but once having been washed it is best to wet it each time of using.

W. M. D.—(1). If by separating the component parts of the back combination you do not obtain a flatter field with your short focus lens, you can do nothing more to it. (2). There is no necessity to empty out the oxygen, it will not harm the cylinder by being kept over till next season. (3). The mark (double B combined), is the mark of the Brin's Company.—The (T & S.), intertwined is that of the Projectile Company.—The number (6880), is that of the cylinder, but we do not know what the (3) underneath is for. The (xx.) with line between, is the annealing mark of Brin's, but as you have not drawn it as given by them, we suppose it must refer to another company, especially as the date 17. 5. 94. is six months later than the date at which this particular cylinder was tested by the Brin's Company. From the particulars however, we cannot tell the maker's name. (4). Yes. A single achromatic lens will do for copying lantern slides in camera.

W.J.C.—In the hands of an adept with either glass or films, there is practically no difference in the results.

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WALTER TYLER'S ANNUAL BOATING TRIP.—Mr. Tyler, having invited his employés and friends to the number of over one hundred to participate in his annual outing, the large party after getting comfortably settled down in saloon carriages left Waterloo Station at 9.40 a.m. on the 24th ult., for Windsor where the steam launch "Her Majesty," was, by previous arrangement, found to be in waiting to convey the guests to Henley. In accordance with an admirably arranged printed programme, the trip was broken at Marlow and other places *en route.* General good feeling prevailed throughout, and music formed one of the attractions when afloat. Soon after the time of starting it was evident that Mr. Tyler, as is his wont on such occasions had catered liberally for the "inner wants of man." It was generally voted that this years' trip even surpassed that given by Mr. Tyler last year, and it goes without saying that everyone had a thoroughly enjoyable day. Waterloo was reached about 10 p.m. when the party separated.